FIG.1

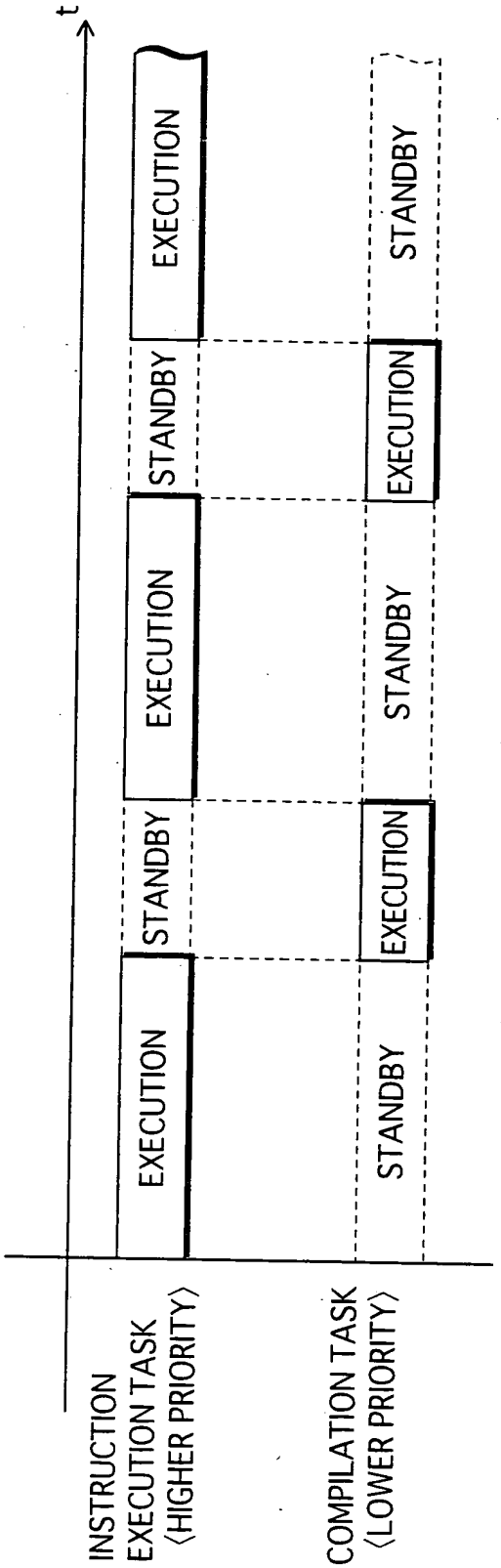

t
EXECUTION
STANDBY
EXECUTION
STANDBY
EXECUTION
STANDBY
EXECUTION
STANDBY
INSTRUCTION EXECUTION TASK 〈HIGHER PRIORITY〉
COMPILATION TASK 〈LOWER PRIORITY〉

FIG.2

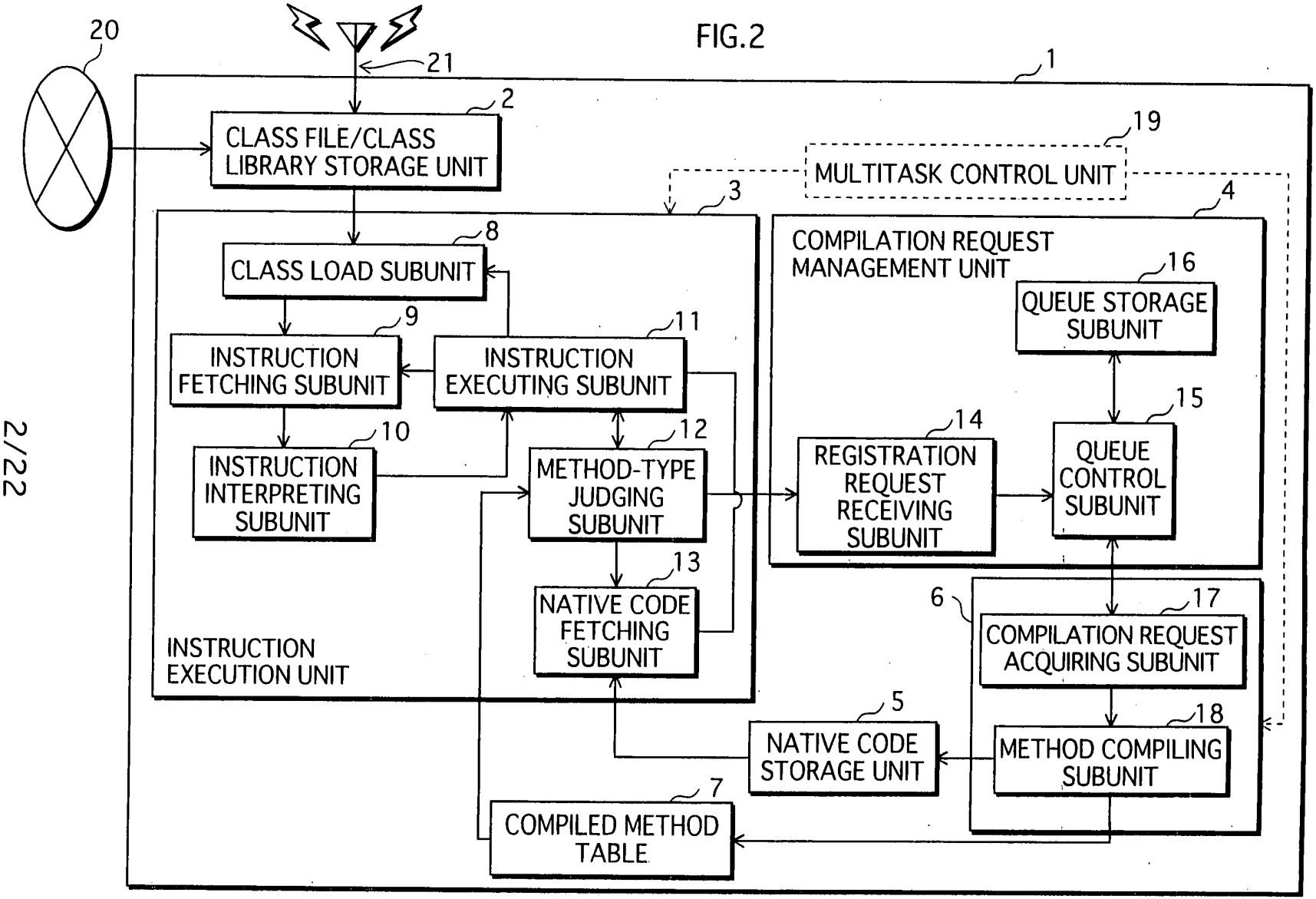

20
21
1
2
CLASS FILE/CLASS LIBRARY STORAGE UNIT
19
MULTITASK CONTROL UNIT
3
4
8
CLASS LOAD SUBUNIT
COMPILATION REQUEST MANAGEMENT UNIT
16
QUEUE STORAGE SUBUNIT
9
11
INSTRUCTION FETCHING SUBUNIT
INSTRUCTION EXECUTING SUBUNIT
15
14
10
12
INSTRUCTION INTERPRETING SUBUNIT
METHOD-TYPE JUDGING SUBUNIT
REGISTRATION REQUEST RECEIVING SUBUNIT
QUEUE CONTROL SUBUNIT
13
6
17
NATIVE CODE FETCHING SUBUNIT
COMPILATION REQUEST ACQUIRING SUBUNIT
INSTRUCTION EXECUTION UNIT
5
18
NATIVE CODE STORAGE UNIT
METHOD COMPILING SUBUNIT
7
COMPILED METHOD TABLE

FIG.3

```
public class  A
        public void init ()  {
            int i ;
            for (i=0; i<10  ; i ++)  {
                    m1() ;
            }

            for (i=0; i<5  ; i ++)  {
                    m2() ;
            }
        }
        public void m1()  {
                .....
        }

        public void m2()  {
                .....
        }
}
```

FIG.4

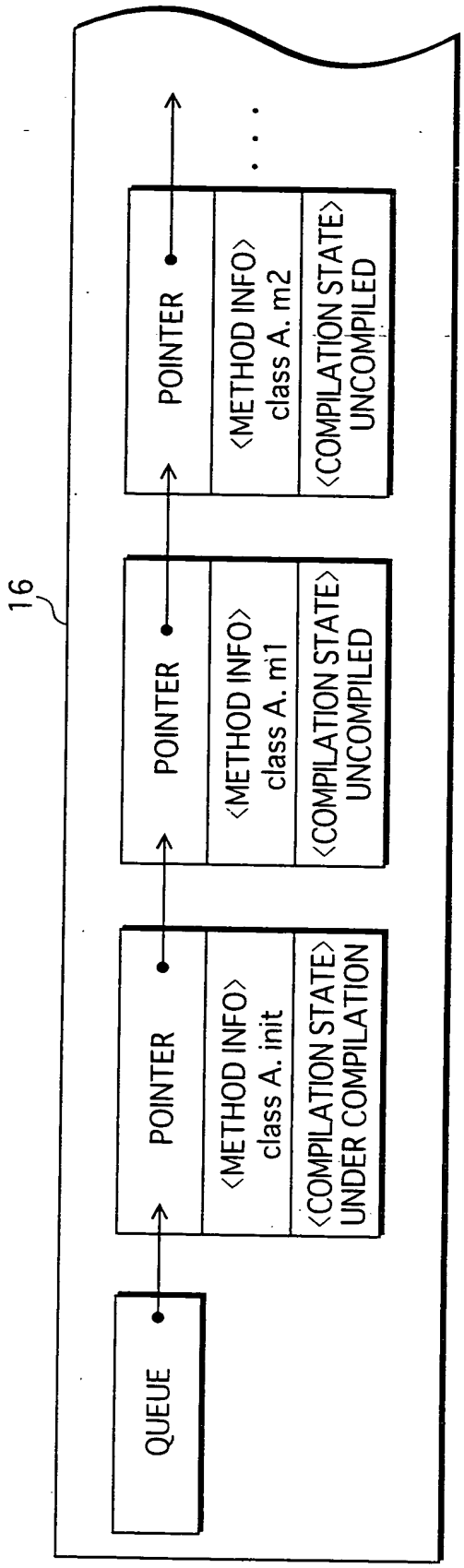

16
QUEUE
POINTER
<METHOD INFO>
class A. init
<COMPILATION STATE>
UNDER COMPILATION
POINTER
<METHOD INFO>
class A. m1
<COMPILATION STATE>
UNCOMPILED
POINTER
<METHOD INFO>
class A. m2
<COMPILATION STATE>
UNCOMPILED

FIG.5

7

COMPILED METHOD NAME	STORAGE ADDRESS
init	0x48000
m 1	0x4a000
m 2	0x4c000

FIG.6

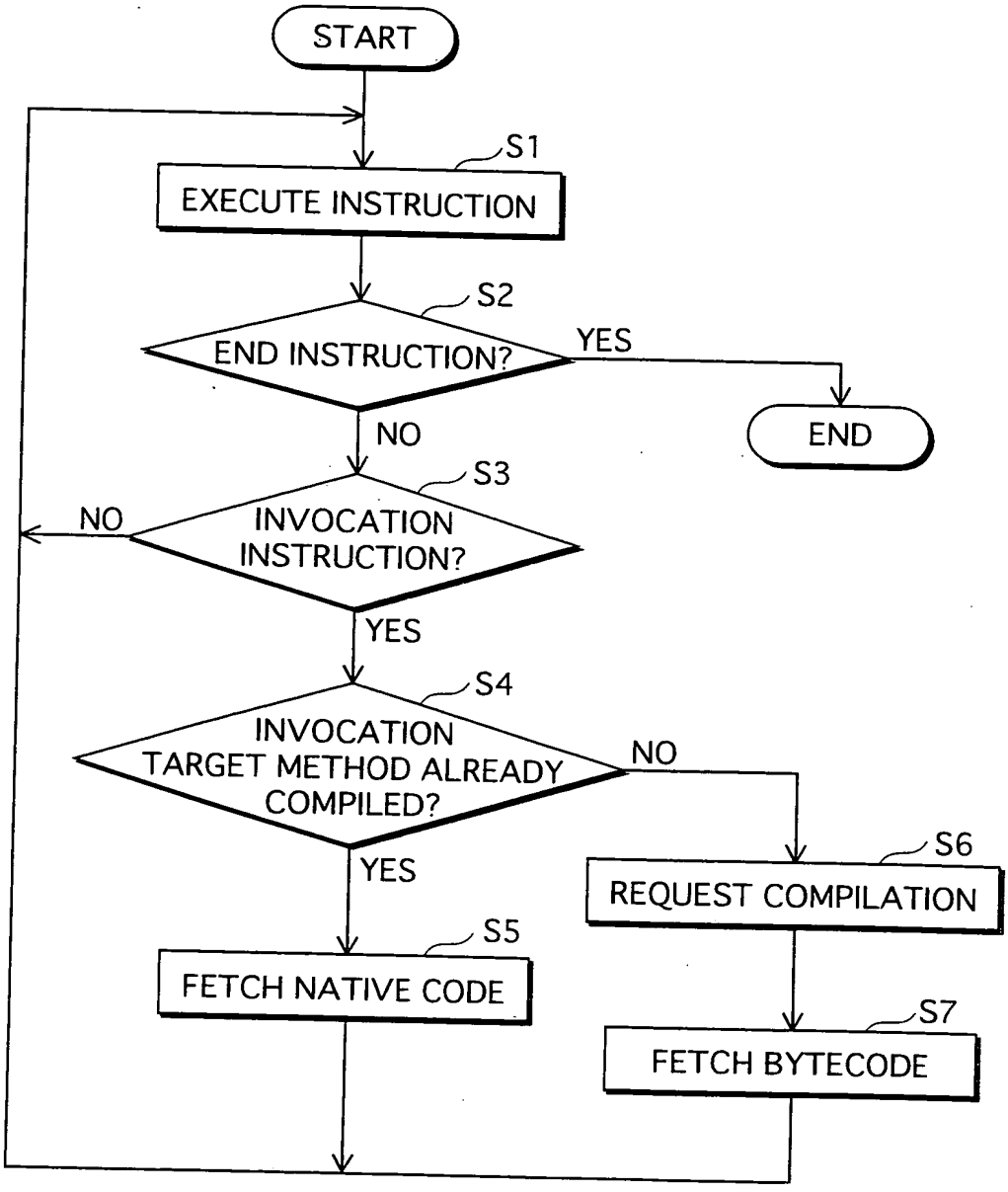

START
S1
EXECUTE INSTRUCTION
S2
END INSTRUCTION?
YES
END
NO
S3
NO
INVOCATION INSTRUCTION?
YES
S4
INVOCATION TARGET METHOD ALREADY COMPILED?
NO
S6
REQUEST COMPILATION
YES
S5
FETCH NATIVE CODE
S7
FETCH BYTECODE

FIG.7

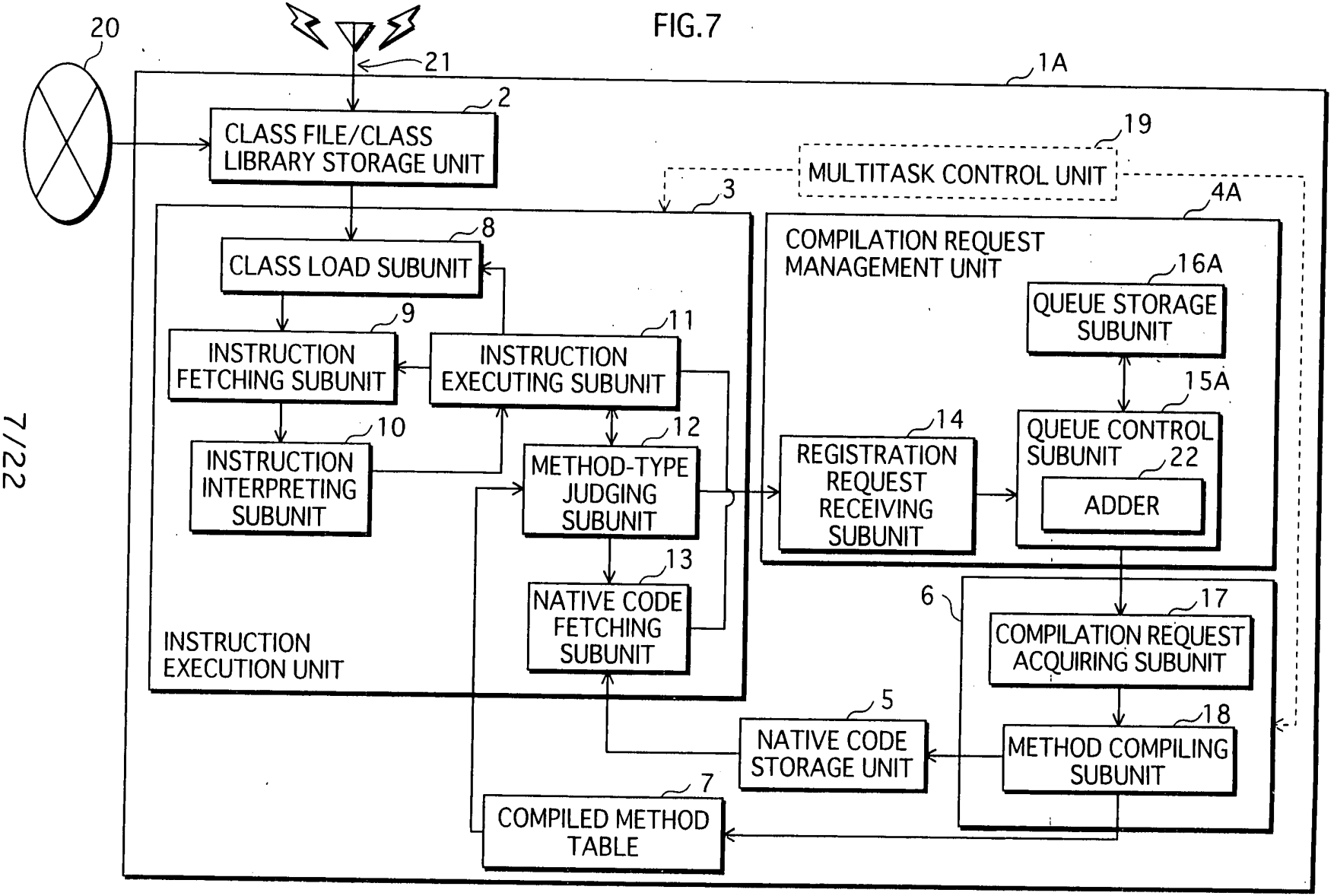

20
21
1A
2
CLASS FILE/CLASS LIBRARY STORAGE UNIT
19
MULTITASK CONTROL UNIT
3
4A
8
CLASS LOAD SUBUNIT
COMPILATION REQUEST MANAGEMENT UNIT
16A
QUEUE STORAGE SUBUNIT
9
11
INSTRUCTION FETCHING SUBUNIT
INSTRUCTION EXECUTING SUBUNIT
15A
14
10
12
QUEUE CONTROL SUBUNIT
22
INSTRUCTION INTERPRETING SUBUNIT
METHOD-TYPE JUDGING SUBUNIT
REGISTRATION REQUEST RECEIVING SUBUNIT
ADDER
13
6
17
NATIVE CODE FETCHING SUBUNIT
COMPILATION REQUEST ACQUIRING SUBUNIT
INSTRUCTION EXECUTION UNIT
5
18
NATIVE CODE STORAGE UNIT
METHOD COMPILING SUBUNIT
7
COMPILED METHOD TABLE

FIG.8

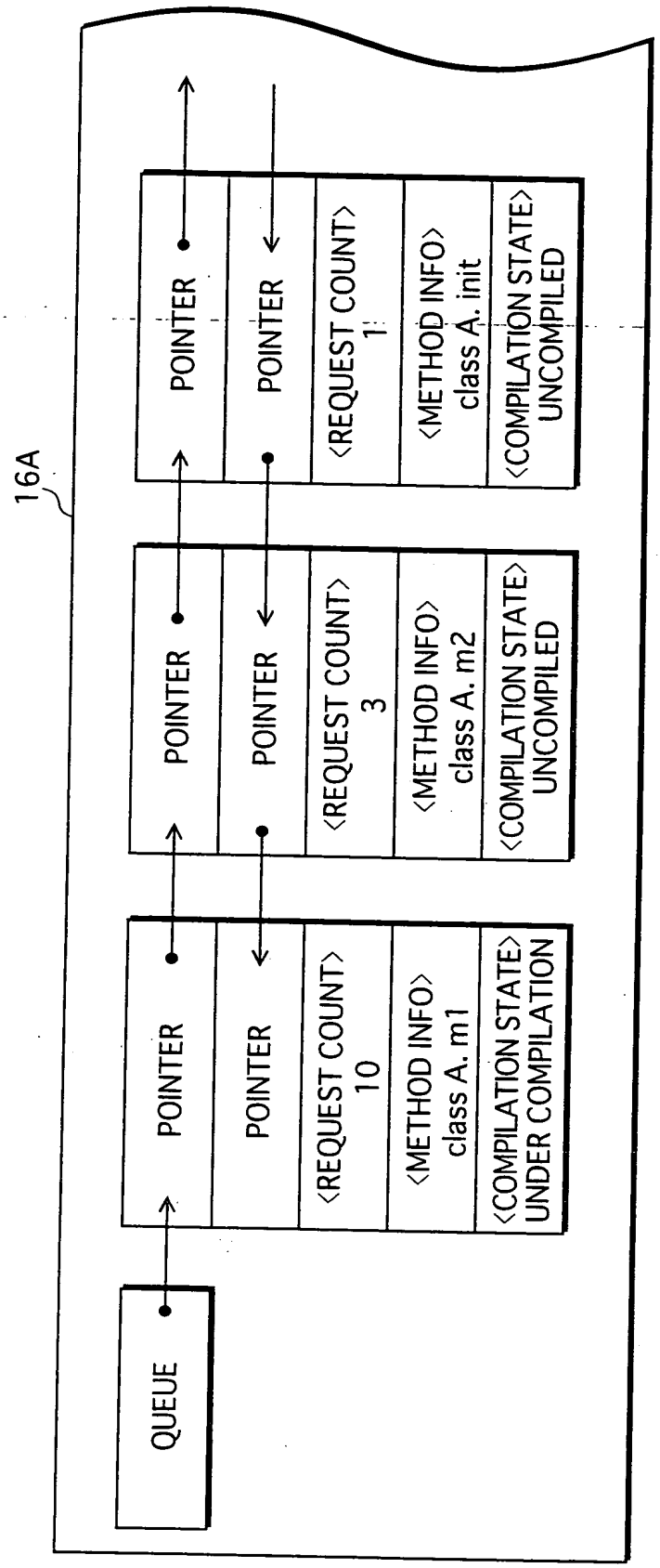

16A
QUEUE
POINTER
POINTER
<REQUEST COUNT>
10
<METHOD INFO>
class A. m1
<COMPILATION STATE>
UNDER COMPILATION
POINTER
POINTER
<REQUEST COUNT>
3
<METHOD INFO>
class A. m2
<COMPILATION STATE>
UNCOMPILED
POINTER
POINTER
<REQUEST COUNT>
1
<METHOD INFO>
class A. init
<COMPILATION STATE>
UNCOMPILED

FIG.9

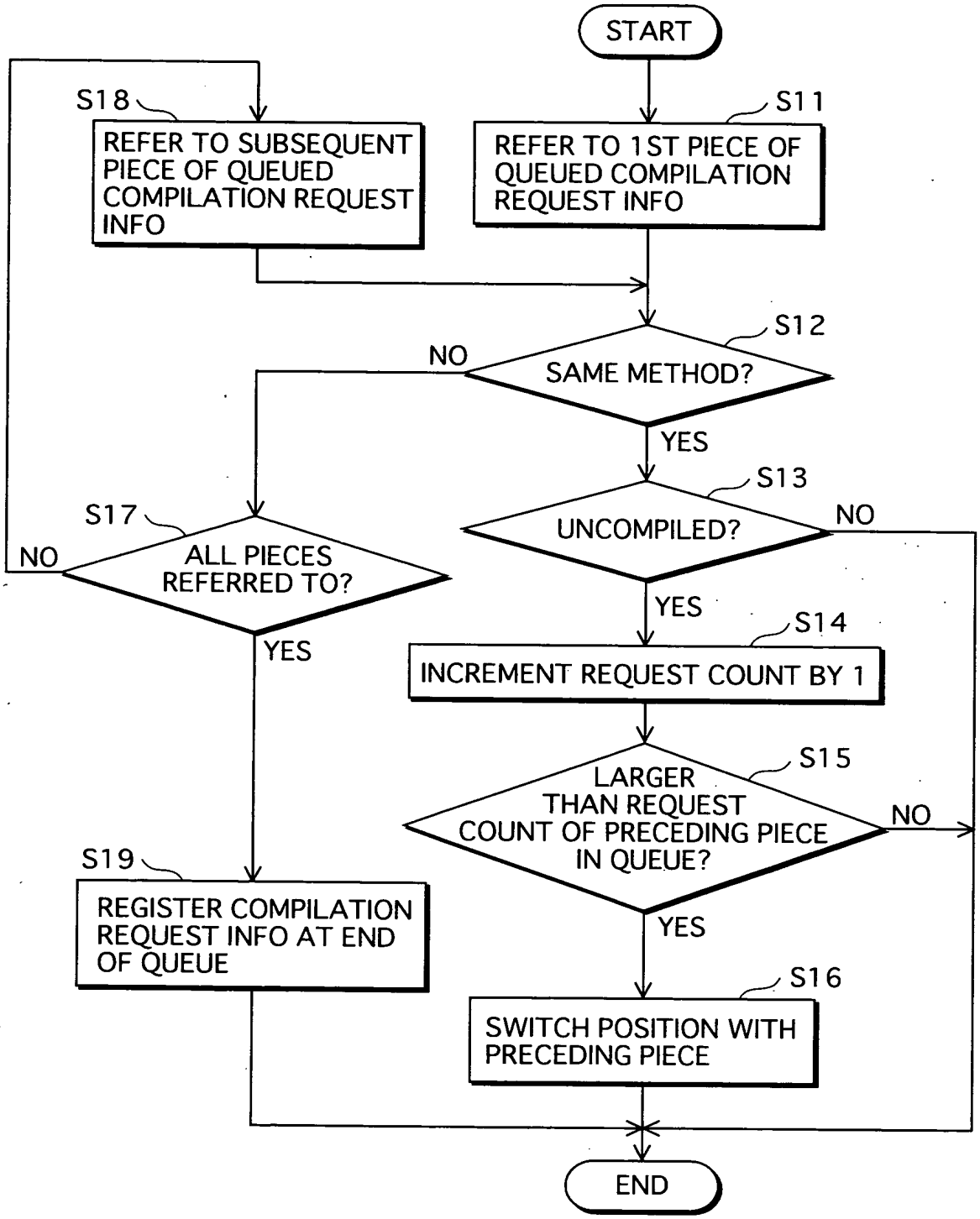

START
S11
REFER TO 1ST PIECE OF QUEUED COMPILATION REQUEST INFO
S12
SAME METHOD?
NO
YES
S13
UNCOMPILED?
NO
YES
S14
INCREMENT REQUEST COUNT BY 1
S15
LARGER THAN REQUEST COUNT OF PRECEDING PIECE IN QUEUE?
NO
YES
S16
SWITCH POSITION WITH PRECEDING PIECE
S17
ALL PIECES REFERRED TO?
NO
YES
S18
REFER TO SUBSEQUENT PIECE OF QUEUED COMPILATION REQUEST INFO
S19
REGISTER COMPILATION REQUEST INFO AT END OF QUEUE
END

FIG.10

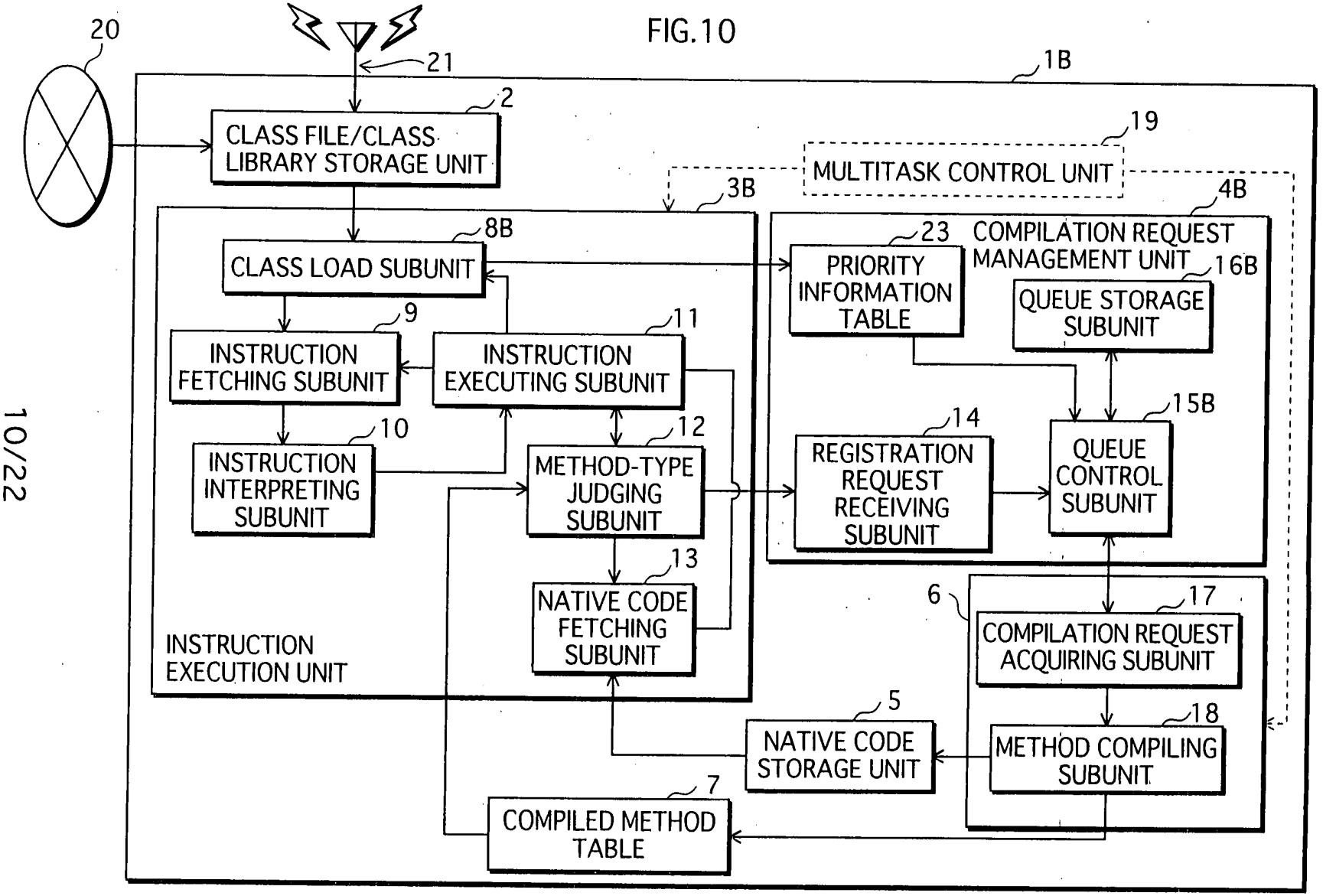

20
21
1B
2
CLASS FILE/CLASS LIBRARY STORAGE UNIT
19
MULTITASK CONTROL UNIT
3B
4B
8B
CLASS LOAD SUBUNIT
23
PRIORITY INFORMATION TABLE
COMPILATION REQUEST MANAGEMENT UNIT
16B
QUEUE STORAGE SUBUNIT
9
INSTRUCTION FETCHING SUBUNIT
11
INSTRUCTION EXECUTING SUBUNIT
15B
14
10
12
INSTRUCTION INTERPRETING SUBUNIT
METHOD-TYPE JUDGING SUBUNIT
REGISTRATION REQUEST RECEIVING SUBUNIT
QUEUE CONTROL SUBUNIT
13
6
17
NATIVE CODE FETCHING SUBUNIT
COMPILATION REQUEST ACQUIRING SUBUNIT
INSTRUCTION EXECUTION UNIT
5
18
NATIVE CODE STORAGE UNIT
METHOD COMPILING SUBUNIT
7
COMPILED METHOD TABLE

FIG.11

19

METHOD NAME	PRIORITY LEVEL
init	4
m 1	1
m 2	3
m 3	5

FIG.12

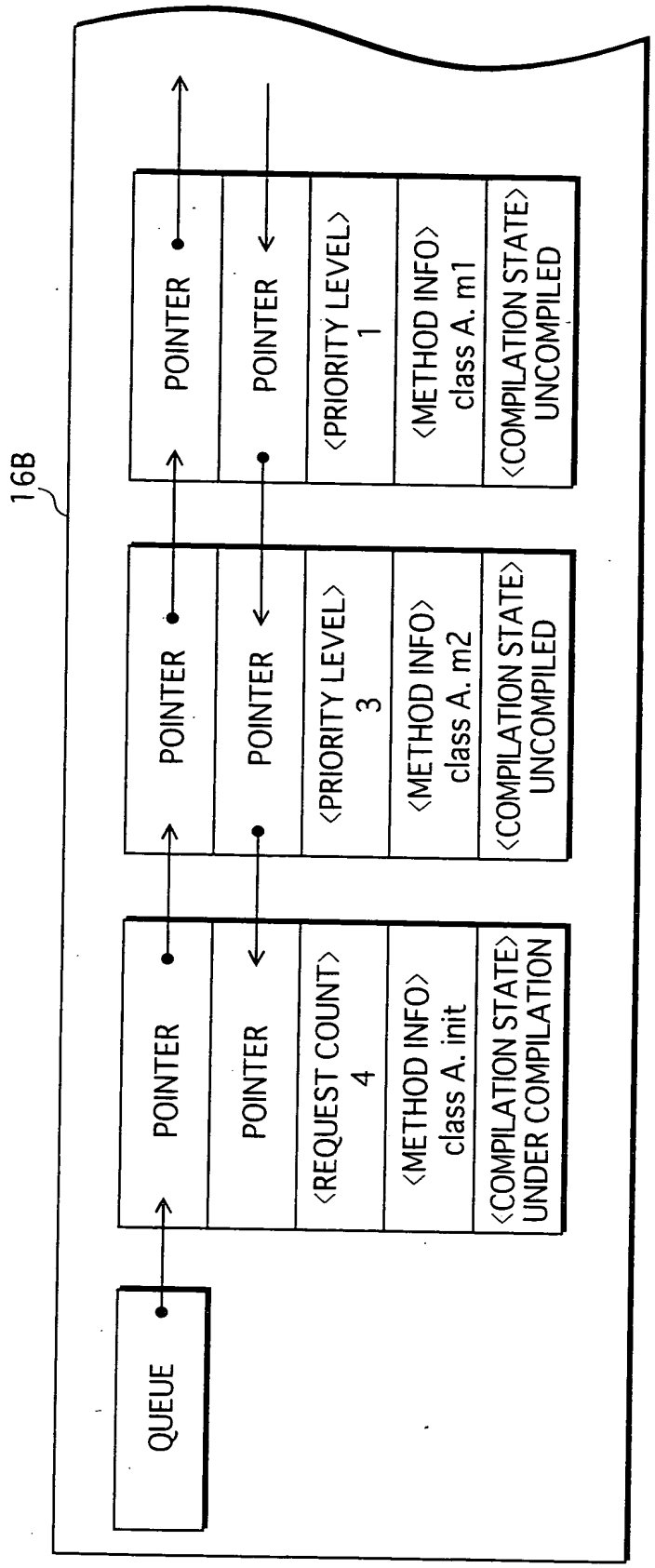

16B
QUEUE
POINTER
POINTER
<REQUEST COUNT>
4
<METHOD INFO>
class A. init
<COMPILATION STATE>
UNDER COMPILATION
POINTER
POINTER
<PRIORITY LEVEL>
3
<METHOD INFO>
class A. m2
<COMPILATION STATE>
UNCOMPILED
POINTER
POINTER
<PRIORITY LEVEL>
1
<METHOD INFO>
class A. m1
<COMPILATION STATE>
UNCOMPILED

FIG.13

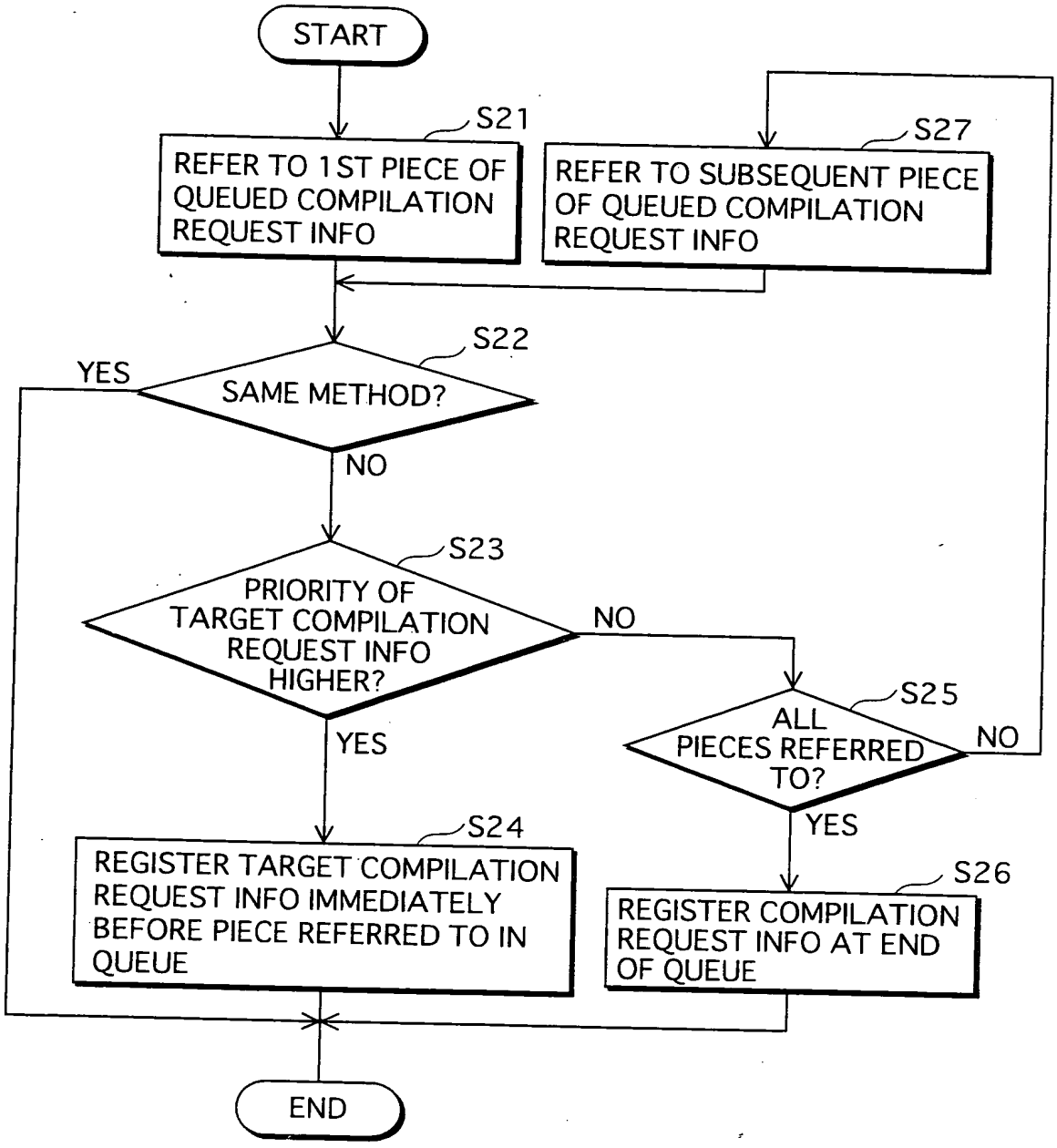

START
S21
REFER TO 1ST PIECE OF QUEUED COMPILATION REQUEST INFO
S27
REFER TO SUBSEQUENT PIECE OF QUEUED COMPILATION REQUEST INFO
S22
SAME METHOD?
YES
NO
S23
PRIORITY OF TARGET COMPILATION REQUEST INFO HIGHER?
NO
YES
S25
ALL PIECES REFERRED TO?
NO
YES
S24
REGISTER TARGET COMPILATION REQUEST INFO IMMEDIATELY BEFORE PIECE REFERRED TO IN QUEUE
S26
REGISTER COMPILATION REQUEST INFO AT END OF QUEUE
END

FIG.14

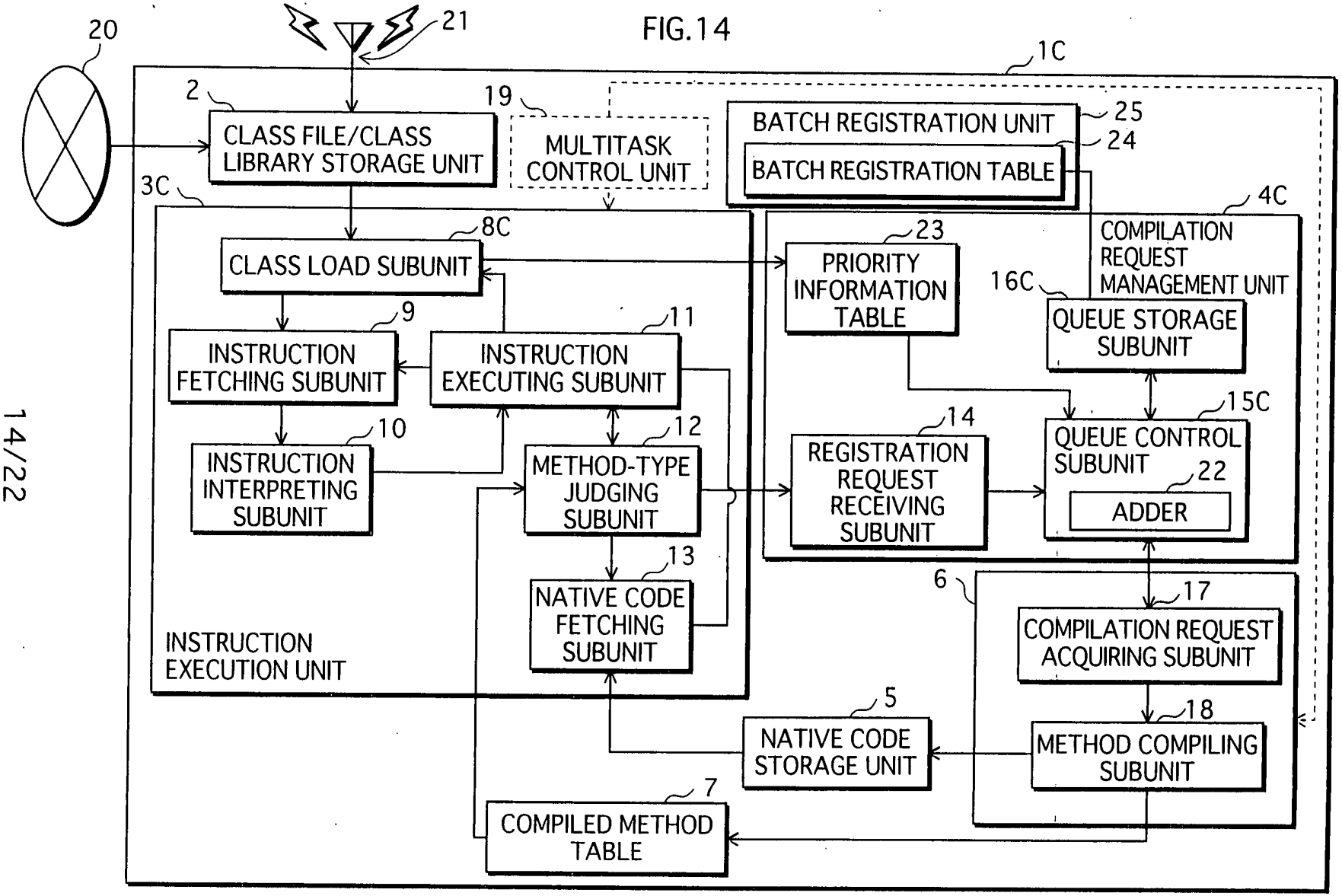

20
21
1C
2
CLASS FILE/CLASS LIBRARY STORAGE UNIT
19
MULTITASK CONTROL UNIT
BATCH REGISTRATION UNIT
25
24
BATCH REGISTRATION TABLE
3C
4C
8C
CLASS LOAD SUBUNIT
23
PRIORITY INFORMATION TABLE
COMPILATION REQUEST MANAGEMENT UNIT
16C
QUEUE STORAGE SUBUNIT
9
INSTRUCTION FETCHING SUBUNIT
11
INSTRUCTION EXECUTING SUBUNIT
15C
14
QUEUE CONTROL SUBUNIT
22
ADDER
10
INSTRUCTION INTERPRETING SUBUNIT
12
METHOD-TYPE JUDGING SUBUNIT
REGISTRATION REQUEST RECEIVING SUBUNIT
13
NATIVE CODE FETCHING SUBUNIT
6
17
COMPILATION REQUEST ACQUIRING SUBUNIT
INSTRUCTION EXECUTION UNIT
5
18
NATIVE CODE STORAGE UNIT
METHOD COMPILING SUBUNIT
7
COMPILED METHOD TABLE

FIG.15

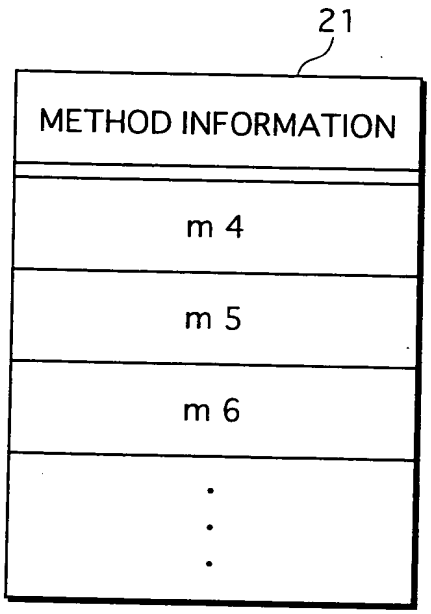


FIG.16

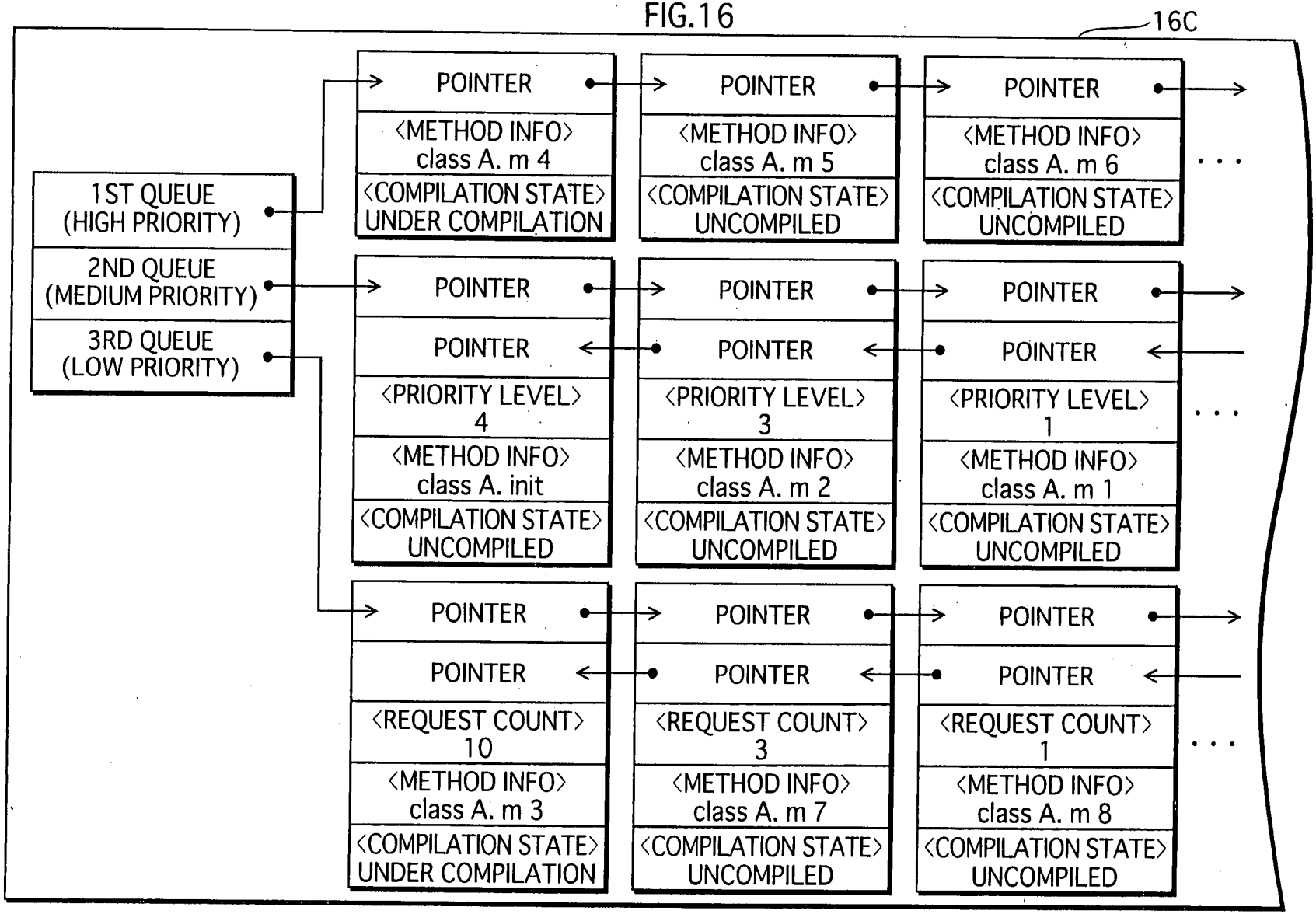

16C
1ST QUEUE (HIGH PRIORITY)
2ND QUEUE (MEDIUM PRIORITY)
3RD QUEUE (LOW PRIORITY)
POINTER
<METHOD INFO> class A. m 4
<COMPILATION STATE> UNDER COMPILATION
POINTER
<METHOD INFO> class A. m 5
<COMPILATION STATE> UNCOMPILED
POINTER
<METHOD INFO> class A. m 6
<COMPILATION STATE> UNCOMPILED
POINTER
POINTER
<PRIORITY LEVEL> 4
<METHOD INFO> class A. init
<COMPILATION STATE> UNCOMPILED
<PRIORITY LEVEL> 3
<METHOD INFO> class A. m 2
<COMPILATION STATE> UNCOMPILED
<PRIORITY LEVEL> 1
<METHOD INFO> class A. m 1
<COMPILATION STATE> UNCOMPILED
<REQUEST COUNT> 10
<METHOD INFO> class A. m 3
<COMPILATION STATE> UNDER COMPILATION
<REQUEST COUNT> 3
<METHOD INFO> class A. m 7
<COMPILATION STATE> UNCOMPILED
<REQUEST COUNT> 1
<METHOD INFO> class A. m 8
<COMPILATION STATE> UNCOMPILED

FIG.17

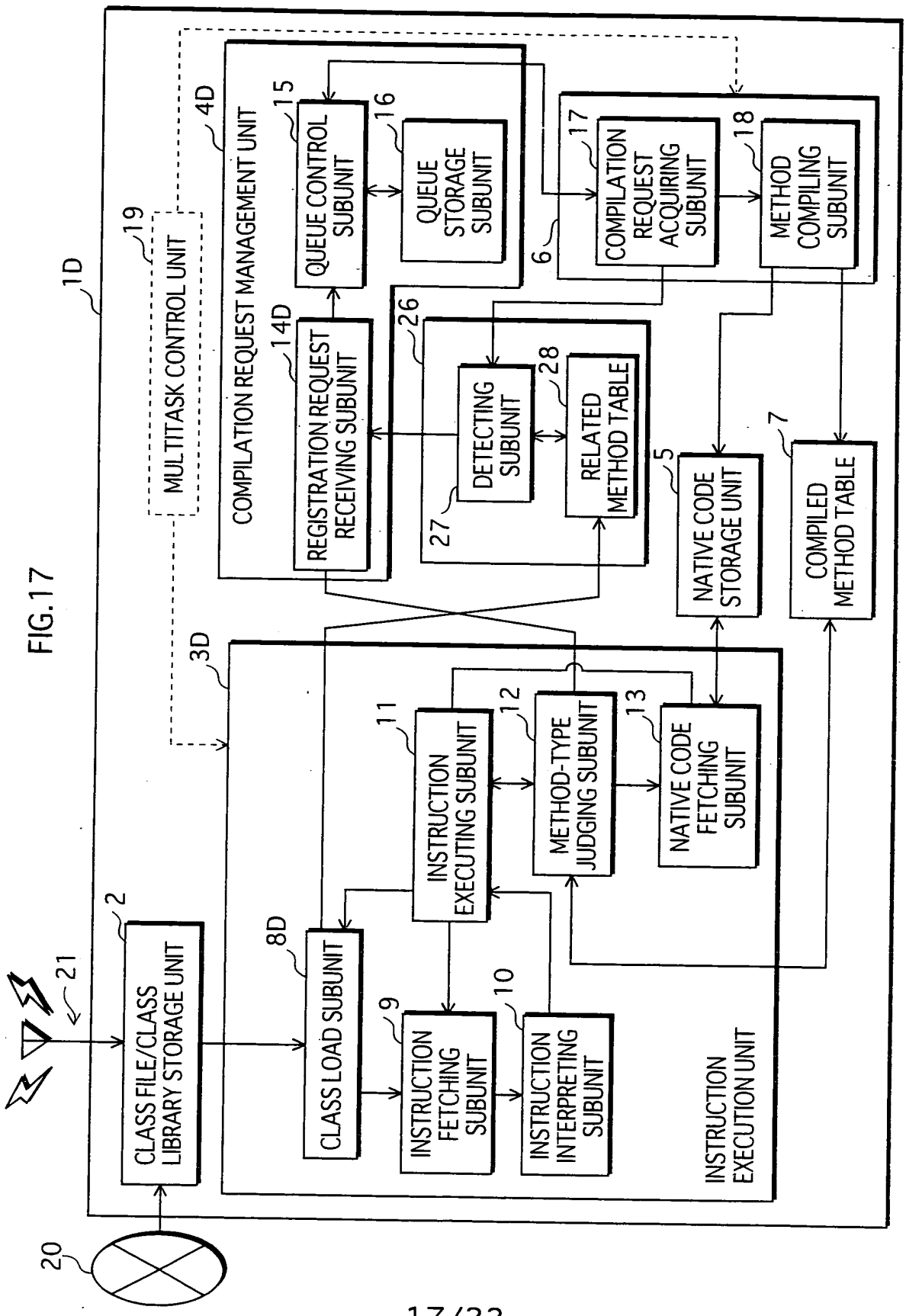

1D
MULTITASK CONTROL UNIT
19
COMPILATION REQUEST MANAGEMENT UNIT
4D
QUEUE CONTROL SUBUNIT
15
QUEUE STORAGE SUBUNIT
16
REGISTRATION REQUEST RECEIVING SUBUNIT
14D
6
COMPILATION REQUEST ACQUIRING SUBUNIT
17
METHOD COMPILING SUBUNIT
18
26
DETECTING SUBUNIT
28
RELATED METHOD TABLE
27
NATIVE CODE STORAGE UNIT
5
COMPILED METHOD TABLE
7
3D
INSTRUCTION EXECUTING SUBUNIT
11
METHOD-TYPE JUDGING SUBUNIT
12
NATIVE CODE FETCHING SUBUNIT
13
8D
CLASS LOAD SUBUNIT
INSTRUCTION FETCHING SUBUNIT
9
INSTRUCTION INTERPRETING SUBUNIT
10
INSTRUCTION EXECUTION UNIT
2
CLASS FILE/CLASS LIBRARY STORAGE UNIT
21
20

FIG.18

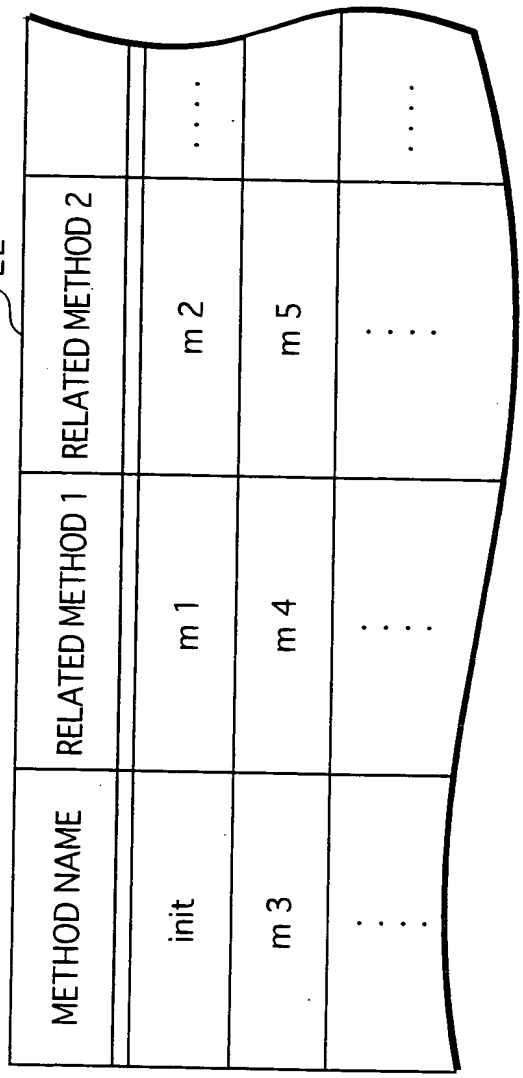

22
METHOD NAME
RELATED METHOD 1
RELATED METHOD 2
init
m 1
m 2
m 3
m 4
m 5

FIG.19

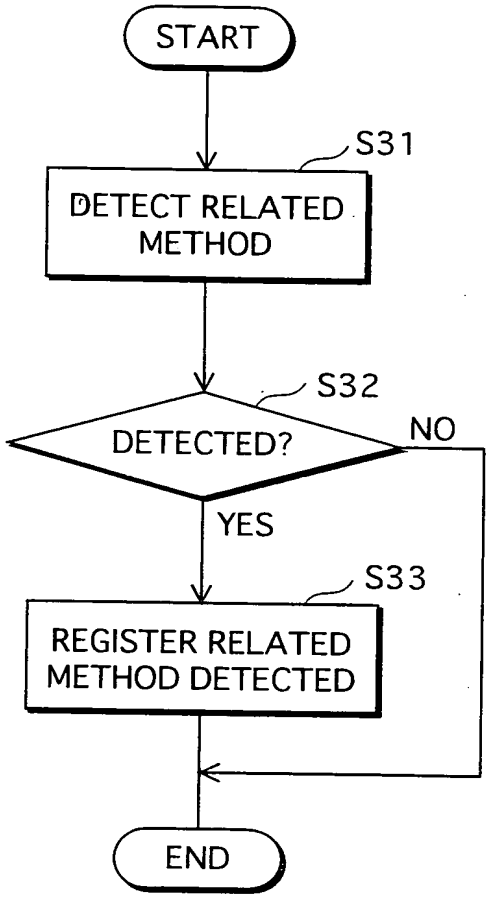

START
S31
DETECT RELATED METHOD
S32
DETECTED?
NO
YES
S33
REGISTER RELATED METHOD DETECTED
END

FIG.20

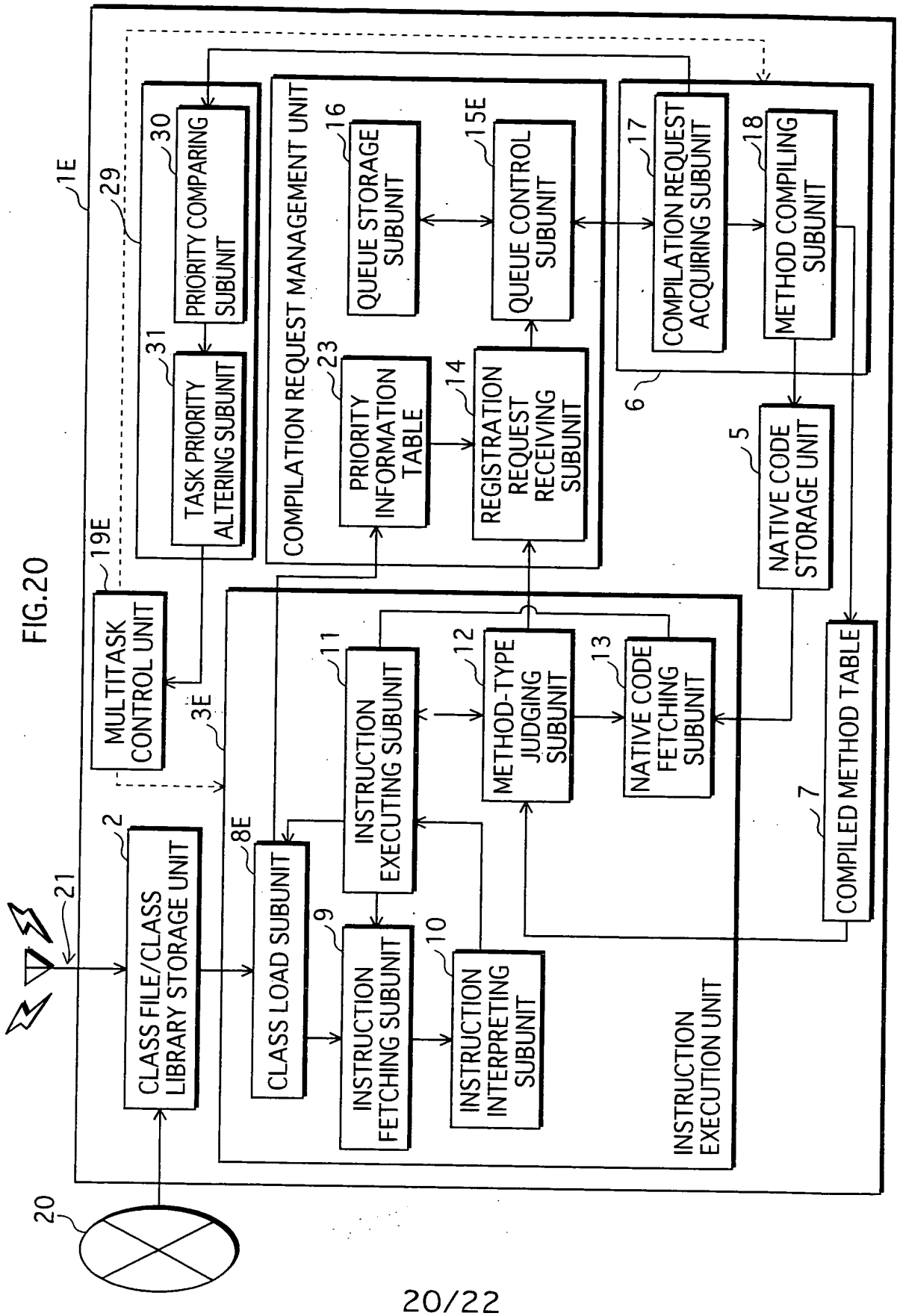

1E
29
30
PRIORITY COMPARING SUBUNIT
31
TASK PRIORITY ALTERING SUBUNIT
COMPILATION REQUEST MANAGEMENT UNIT
16
QUEUE STORAGE SUBUNIT
15E
QUEUE CONTROL SUBUNIT
23
PRIORITY INFORMATION TABLE
14
REGISTRATION REQUEST RECEIVING SUBUNIT
6
17
COMPILATION REQUEST ACQUIRING SUBUNIT
18
METHOD COMPILING SUBUNIT
5
NATIVE CODE STORAGE UNIT
19E
MULTITASK CONTROL UNIT
3E
11
INSTRUCTION EXECUTING SUBUNIT
12
METHOD-TYPE JUDGING SUBUNIT
13
NATIVE CODE FETCHING SUBUNIT
7
COMPILED METHOD TABLE
2
CLASS FILE/CLASS LIBRARY STORAGE UNIT
8E
CLASS LOAD SUBUNIT
9
INSTRUCTION FETCHING SUBUNIT
10
INSTRUCTION INTERPRETING SUBUNIT
INSTRUCTION EXECUTION UNIT
21
20

FIG.21

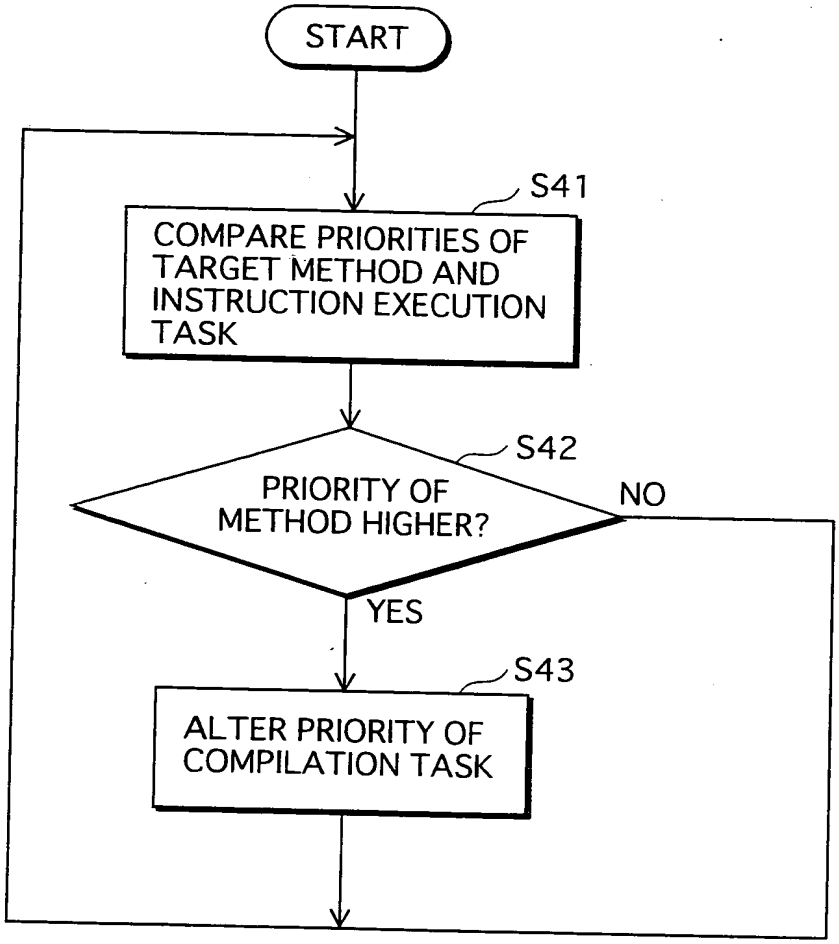
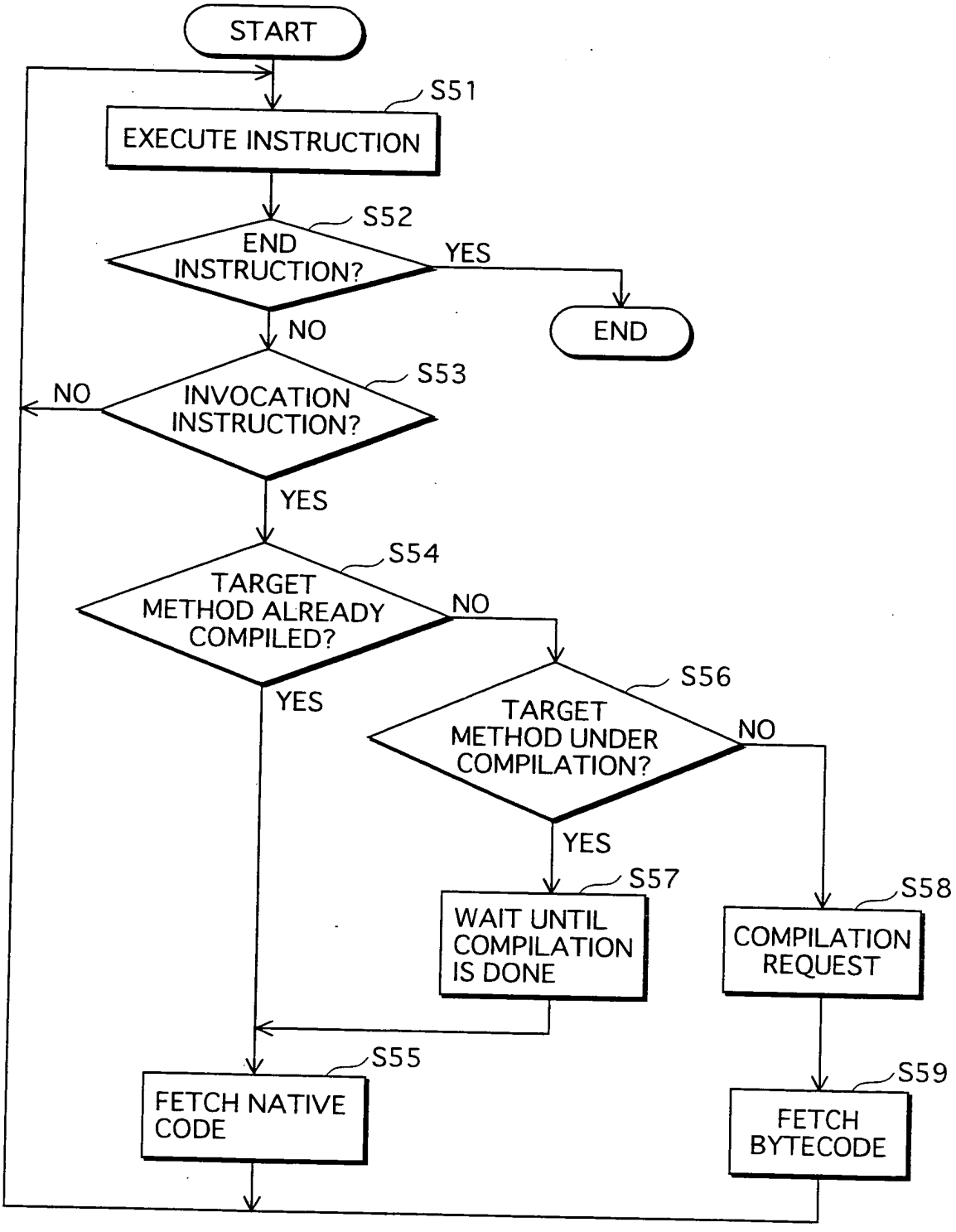

START
S41
COMPARE PRIORITIES OF TARGET METHOD AND INSTRUCTION EXECUTION TASK
S42
PRIORITY OF METHOD HIGHER?
NO
YES
S43
ALTER PRIORITY OF COMPILATION TASK

FIG.22


START
S51
EXECUTE INSTRUCTION
S52
END INSTRUCTION?
YES
END
NO
S53
INVOCATION INSTRUCTION?
NO
YES
S54
TARGET METHOD ALREADY COMPILED?
NO
YES
S56
TARGET METHOD UNDER COMPILATION?
NO
YES
S57
WAIT UNTIL COMPILATION IS DONE
S58
COMPILATION REQUEST
S55
FETCH NATIVE CODE
S59
FETCH BYTECODE